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Uganda Solar Report

Prepared by J.v.G. Technology GmbH
J.v.G. Technology GmbH is a German engineering company specializing in turnkey solar module production lines and manufacturing consulting, with project experience ranging from 20 MW to 500 MW per production line, including multi-line and gigafactory projects exceeding this scale.

This Solar Report is part of the **PVKnowHow** Knowledge Network.
The data, analysis, and conclusions in this document are based on real research, consulting insights, and international solar market data.

Gain comprehensive insights into the statistics and metrics surrounding the solar production industry in Uganda

KEY POINTS

All figures have been converted into USD

Yearly sunshine (sun hours per year)

The average yearly sunshine duration is essential for solar energy generation.

This varies across different regions.

- Coastal areas may receive about 2500 hours of sunshine.
- Inland areas may receive up to 3000 hours of sunshine.

kWh per kWp installed

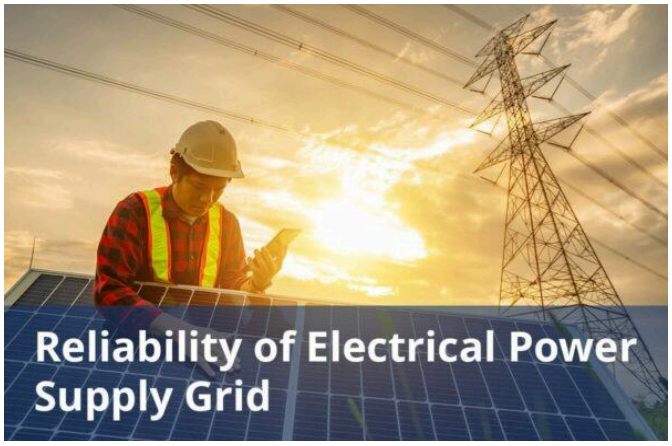
The energy output of solar panels is often measured in kWh per kWp.

- Standard panels may produce around 1000 kWh/kWp annually in optimal conditions.
- Higher efficiency panels can produce more.

Average cost per kWh from utility company

Average cost per kWh for residential customers generally varies by location.

- Some regions report costs of around $0.12/kWh.
- In contrast, other areas may experience higher rates up to $0.18/kWh.



Reliability of electrical power supply grid

Solar energy reliability is impacted by factors such as weather and technology.

- Modern solar systems have over 90% reliability.

- Maintenance practices can significantly influence system performance.




DETAILED INFORMATION

All figures have been converted into USD

Total solar panel production capacity (installed)

The total number of solar panels installed globally has seen tremendous growth.

- As of the latest counts, approximately 2.5 million solar panels are installed annually.
- Growth rates vary by country.

Total solar panel production capacity (projected)

Future projections suggest increased installations of solar panels.

- Experts estimate growth to 10 million panels annually by 2025.
- This reflects a shift towards renewable energy adoption globally.

Average costs of various electricity generation sources (coal, natural gas, solar, etc)

The cost of solar panel installation has decreased over the years.

- Average installation costs today hover around $3.00/W.
- Incentives and subsidies further affect pricing.

Percentages of various electricity generation sources (coal, natural gas, solar, etc)

The contribution of solar energy to electricity generation is growing.

- On average, solar accounts for about 15% of total electricity in some states.
- Certain regions are approaching 25% generation from solar.

Average daily availability of electricity from the national grid (measured in hours)

Daily availability of solar energy can fluctuate.

- Factors such as cloud cover and seasonal changes play a role.
- Typically, summer months yield greater solar output.

Number of residential solar panel installations

The number of residential solar panels installed continues to rise.

- As of recent statistics, there are about 1 million residential solar systems in operation.
- This number increases annually.

Total number of solar farms (installed and projected)

The number of solar farms is on the rise, contributing significantly to energy production.

- Currently, there are over 2500 operational solar farms nationwide.
- Each farm adds substantial solar capacity.

Off-grid market demand for solar panels (current and projected)

The off-grid solar panel market in Uganda is experiencing significant growth, driven by several factors, and is projected to continue expanding in the coming years.

Here's a breakdown of the current state and future prospects:

Current Demand Drivers:
- A large portion of Uganda's population (over 60%) lacks access to the national grid, making off-grid solar solutions a viable.
- Government policies promoting renewable energy and off-grid solutions create a supportive environment for solar.
- Globally falling solar panel prices make off-grid solutions more affordable for Ugandan households.
- Sales of Solar Home Systems (SHS) have been steadily increasing in Uganda, reflecting growing demand.
- Companies are offering a wider variety of off-grid solar products catering to different needs and budgets.
- Investments in the off-grid solar sector in Uganda are on the rise, indicating confidence in the market's potential.

Projected Growth:
- Uganda's national electrification rate stands at 42.1 %, below the sub-Saharan African average of 43 %.

- The national electricity grid powers 60 % of urban areas and 18 % of rural areas.
- However, because the use of SHS in rural areas has grown from 18 % in 2017 to 38 % in 2020, grid use has dropped from 22 % to 19 % in the same period.
- As a result, off-grid systems can help to fill the energy gap by creating demand and providing energy access in rural areas, where 73 % of the population lives.
- These unelectrified rural areas present a business opportunity for off-grid energy providers to supply cleaner and more reliable power to households and businesses, helping Uganda achieve its universal electrification goal by 2030.

On-grid market demand for solar panels (current and projected)

Uganda experienced significant growth in its solar energy capacity, reaching 92 MW in 2021 and further increasing by approximately 6.9 MW to a total of 98.9 MW in 2022.

Uganda has ambitious plans for solar energy to contribute significantly to its energy mix by 2040.

The country aims for solar energy to account for 5,000 MW out of a total anticipated cumulative capacity of 41,700 MW by 2040.

This goal is part of Uganda’s Vision 2040, which seeks to enhance energy security, support economic growth, and promote environmental sustainability.

Average monthly income of workers in solar industry (labor cost)

The average salary of workers in the solar industry is described below:

* Electrical Engineer: $390.96- 781.93
* Electrician: $208.51- 390.96
* Design Engineering Manager: $781.93- 1303.22
* Solar Energy System Installer: $130.32- 312.77
* Solar Energy / Solar Power Engineer: $469.16- 912.25
* Solar Installation Electrician: $182.45- 338.84
* Business Development Manager: $521.29- 1042.57

Population of the country

As of May 19, 2024, the estimated population of Uganda is approximately 49.7 million.

Average overhead costs of solar panel production (with a brief breakdown)

Determining the exact average overhead cost of solar panel production in Uganda involves several key factors.

Here's a detailed breakdown based on available data:

Raw Material Costs:
- The cost of raw materials like silicon, aluminum, and silver constitutes a significant portion of the production costs.
- Globally, raw material costs account for approximately 20-40% of the production costs of solar panels.

Labor Costs:

- Labor costs in Uganda are relatively low compared to Western countries.
- The current minimum wage in Uganda is roughly equivalent to $35 USD per month.

Utilities and Energy Costs:
- The energy-intensive nature of solar panel production means that utilities, particularly electricity, are a major cost component.

Electricity Tariff:
- The average cost per kWh from a utility company in Uganda depends on the type of consumer and their consumption level.

Administrative Expenses:
- This includes the salaries of administrative staff, office supplies, and other general expenses, which contribute to the overhead costs.

Quality Control:
- Ensuring the solar panels meet performance and safety standards involves testing and inspections, which add to the overhead costs.

A summary of the energy infrastructure

Uganda's energy infrastructure is undergoing development, with a focus on increasing access to electricity and transitioning towards renewable energy sources.

Hydropower is the dominant source of electricity generation, accounting for over 80% of installed capacity.

Biomass, solar, and thermal sources contribute a smaller portion to the energy mix.

The government is promoting renewable energy sources like solar and geothermal to diversify the energy mix and reduce reliance on hydropower.

Despite recent progress, Uganda's national electricity access rate remains low, with only around 22.1% of the population having access as of December 2022.

Some of the government regulations surrounding solar panel production

Uganda's regulations surrounding solar energy focus primarily on promoting its use rather than restricting it.

Regulations for Solar Panel Installations:
- Installing solar panels for residential, commercial, or industrial use is generally permitted in Uganda.
- The Uganda National Bureau of Standards (UNBS) likely sets standards for imported solar panels.
- Depending on the size and complexity of the installation, permits from local authorities might be required.

Regulations for Net Metering:
- Currently, net metering regulations in Uganda are not well established.

Tax Incentives:
- Uganda offers import duty exemptions on solar panels, batteries, and other solar equipment to encourage adoption.

Government initiatives in solar panel production (includes investments and subsidies)

While Uganda's solar panel manufacturing industry is still young, the government has shown interest in its development through various initiatives and strategies.

* **Renewable Energy Strategy and Policy (2018):** This strategy promotes the development of renewable energy sources, including solar, and could potentially provide a framework for supporting domestic solar panel manufacturing.
* **Draft National Energy Policy (2019):** This policy emphasizes diversifying the energy mix with renewables like solar, potentially creating demand for solar panels.
* **National Electrification Strategy (NES):** The NES aims for universal electricity access, and solar power could play a significant role.
* **Energy for Rural Transformation (ERT) Project:** This ongoing project utilizes various renewable energy sources, including solar, for electrification in rural areas.
* **Vision 2040:** Uganda's Vision 2040 sets the stage for a future where solar energy plays a significant role in achieving the country's development goals.

Notable solar projects in the country (installed and projected)

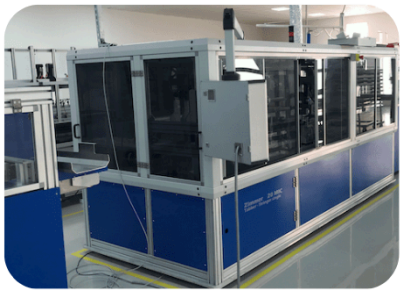
Installed
1. **50 MW Tororo Solar Power Plant (Operational):** This 50MW solar plant, located in Tororo district, became operational in 2020.
2. **Kabulasoke Solar Power Station:** This 20MW solar plant, located in Gomba district, became operational in 2019.
3. **Bufulubi Power Plant:** This solar project added 10 MW to the national grid in 2019.

4. **Soroti Solar Power Station:** This 20MW solar plant, located in Soroti district, became operational in 2016.
5. **Tororo Solar North Power Plant:** This 10MW solar plant, located in Tororo district, became operational in 2017.

Projected
- **Emerging Africa Infrastructure Fund Invests in 20MW Ituka Solar PV Project:** This project secured funding in November 2023.
- **150MW Kabulasoke Solar Power Plant (Under Development):** This project, signed in December 2023, involves the construction of a 150MW photovoltaic solar plant in the Kween district.

Some of the notable solar companies (plus brief details on what they do)

* **Akua Power (Blackstone Group company):** Signed a Power Purchase Agreement (PPA) with the Ugandan government for the development of a 200MW solar power plant project in 2022.
* **SolarAfrica Inc.:** Assembles and distributes solar panels for domestic and commercial applications.
* **SolarVilla:** Intends to design solar photovoltaic systems for health centers in rural areas.
* **Innovex UG:** Transforming the distribution of off-grid energy and equipment using IoT.
* **Village Energy:** A last-mile distributor of customized solar installations.
* **Powerhive:** Developing and operating mini-grids powered by solar and battery storage.



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All market data, analysis, and conclusions follow JvG's internal consulting standards and international PV market research practices.

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J.v.G. Technology GmbH is a European engineering and advisory specialist for solar production lines and manufacturing equipment, supporting investors and operators with market, location and production-focused decision frameworks.
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